Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of:	)	
	)	CC Docket 94-102
Revision of the Commission's Rules	)	
To Ensure Compatibility with	)	
Enhanced 911 Emergency Calling Systems	)	
	)	
	)	
Second Reporting	)	

To: The Commission

QWEST WIRELESS, LLC AND TW WIRELESS, LLC's SECOND QUARTER 2001 REPORTING TO BE FILED THROUGH TTY FORUM

Pursuant to the FCC's Fourth Report and Order, dated December 14, 2000, in the CC Docket referred to above, Qwest Wireless, LLC, and TW Wireless, LLC [5]("collectively, Qwest") hereby submit their second report to the TTY Forum for compilation and timely filing with the FCC.

1. Network Infrastructure Software Development

Qwest uses two mobile switching center software vendors, Lucent and Nortel/Ericsson. Lucent is used certain Qwest markets in Washington, Oregon, Arizona, Colorado, and Minnesota. Nortel/Ericsson is used in the remaining Qwest markets in Washington, Oregon, Arizona, new Mexico, Colorado, Utah, Nebraska, Montana, and Idaho.

In order to meet its mandates regarding TTY compatibility, Qwest is completely dependent on Lucent and Nortel/Ericsson to timely deliver the TTY-compliant software.

Based on information received from Lucent, Lucent will make the required software availabe to Qwest by November 1, 2001. If Lucent delivers according to this anticipated schedule, Qwest will be on track in terms of installing required software and hardware in the Lucent markets.

Based on information received from Nortel/Ericsson, Nortel/Ericsson will make the required software available by January 2002. If Nortel/Ericsson delivers according to this anticipated schedule, Qwest will experience a delay in the software installation required by December 31, 2001. However, Qwest will still be able to test during the first quarter of 2002 and remain on track with respect to the June 30, 2002 deadline.

[5] Qwest Wireless, LLC, together with TW Wireless, LLC, a joint venture in which Qwest Wireless, LLC holds a majority equity and sole controlling ownership interest, provides broadband PCS services in a number of markets. This filing is submitted on behalf of both Qwest Wireless, LLC, and TW Wireless, LLC.

In connection with the scheduling of software deployment, Qwest is also working on the installation plans for vocoder hardware PHV3 or PHV4. Such vocoder hardware is also necessary to achieve network TTY compatibility.

2. ***Handset Development and Testing Plans***
Qwest is discussing TTY-compatible handsets with its vendors. It appears that two such handsets will be available in the first quarter of 2002.

3. Beta Testing and Lab Testing'
No beta testing has been scheduled, as it is too early in the process.

4. *Release and General Availability to Carriers of Network Infrastructure Software*
See answer to question 1.

5. ***Availability to Carriers of Full Acceptance Test Units***
Actual test units are not yet available at this time. Qwest continues to rely on the statement of its handset vendor Kyocera that the K1 model, which will feature a TTY connection, will be available by the beginning of next year.

6. ***Efforts Towards Achieving Digital Wireless Solution Compatibility with enhanced TTY Devices***
Qwest plans to purchase representative samples of TTY devices to use in its testing efforts.

7. Carrier Coordination of Testing with PSAPS
Qwest expects this to be accomplished in connection with its E911 mandated testing. Qwest will coordinate testing with one or multiple PSAPs, pending upcoming discussions with various PSAPs.

8. Carrier Testing Activities
There are no testing activities scheduled as it is too early in the process.

9. Retail Availability of Necessary Consumer Equipment
Based on the information available to Qwest, there are no compatible handsets available at the present time. However, based on information from its handset vendors, Qwest expects that TTY-compatible handset models from two different vendors will be available in the first quarter of 2002. Qwest is also researching the purchase of handsets connectable to TTY devices via a standard earpiece jack

10. Geographic Scope of Network Infrastructure Deployment
Asa mentioned in the answer to question 1 above, deployment is expected to occur in the Lucent markets by December 31, 2001, and in the Nortel/Ericsson markets by January 2002.

Respectfully submitted:

/S/ Floy H. Jeffares

Floy H. Jeffares, Government Affairs Manager

RTSC Communications, Inc. (RTSC)
TTY Report
Monday, July 09, 2001

1. **Network Infrastructure Software Development**: Specific technology has not been identified. RTSC is proposing to utilize its wireless facilities to provide a fixed wireless local loop application.

2. **Handset Development and Testing Plans**: No handsets are currently in use. When the system is constructed, development and testing will be done by the equipment vendors. This will be a criteria for selecting vendors.

3. **Beta Testing and Lab Testing**: We will rely on the equipment vendors selected to conduct beta and lab tests.

4. **Availability of Network Infrastructure Software**: As of this date, we have not selected a vendor, but these capabilities will be taken into consideration.

5. **Availability of Full Acceptance Test Units**: To this date, none are available.

6. **Digital Wireless Solution Compatibility with Enhanced TTY Devices**: Once vendors are selected, we shall encourage them to comply with TTY devices by the deadline.

7. **Coordination of Testing with PSAP**: Once we have a system and selected vendors, we will coordinate tests with our local PSAP.

8. **Carrier Testing Activities**: Once our infrastructure is in place, we will comply with all testing recommended or required.

9. **Retail Availability**: None available at this time

10. **Geographic Scope of Network Deployment**: Fixed wireless is being studied for population centers, no deployment is scheduled at this time.

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TTY Forum #18 Carrier Status Report
July 10, 2001
Rural Cellular Corporation for itself and its affiliates (collectively "RCC")

1. Network Infrastructure Software Development

   TDMA Networks: RCC utilizes TDMA infrastructure from Lucent, Ericsson and Nortel. RCC is relying on these three infrastructure vendors to complete software development.

   GSM Network: RCC is currently evaluating options for TTY support over GSM.

2. Handset Development and Testing Plans

   RCC is relying on its handset vendors for the development and testing of TTY capable handsets. Once handsets are available for testing, RCC will perform field tests in accordance with the Loeber and Walsh test plan submitted to the TTY Forum.

3. Beta Testing and Lab Testing

   Once TTY capable software is in place and handsets are available, RCC will begin field tests.

4. Release and General Availability to Carriers of Network Software

   RCC's infrastructure vendors have stated that the software releases to support TTY capability should be available by December 2001.

5. Availability to Carriers of Full Acceptance Test Units

   RCC is waiting for commitments from its handset vendors for the date that they will have full acceptance test units available.

6. Efforts Towards Achieving Digital Wireless Solution Compatibility with Enhanced TTY Devices

   RCC is working with its vendors and now with the TTY Forum to achieve a standard to support enhanced TTY devices.

7. Carrier Coordination of Testing with PSAP

   RCC will conduct TTY testing with any PSAP that requests testing.

8. Carrier Testing Activities, Including Field Testing and Consumer End-To-End Testing

RCC will conduct consumer end-to-end testing after acceptable handsets and infrastructure software upgrades are in place and tested.

9. Retail Availability of Necessary Consumer Equipment

Retail availability is uncertain at this time.

10. Geographic Scope of Network Deployment

RCC is proceeding on a path that assumes it will be able to meet a June 30, 2002 deployment deadline.

Siemens
TTY Report
July 11th, 2001

Siemens is investing a significant amount of effort in order to comply with the FCC requirement to support E911 calls made from TTY devices on wireless digital networks. The status provided below is based on the currently available TTY/CTM standards and assumes no changes to these standards.

Network Implementation

Siemens is developing a BSS based TTY solution. This is a "Transcoder Pooling" solution now referred to as "CTM circuit pooling solution". This solution may be implemented as an external network element on the A- interface or integrated within the TRAU. The Siemens solution will not impact the existing vocoders already deployed and supported by Siemens.

Siemens expects the first prototype units (including the necessary hardware and software) to be made available to wireless operators for testing at the end of 2001. This will allow sufficient time for the network integration testing required to meet the in service date of June 2002.

Handsets Implementation

Siemens Handset group plans to support TTY in 2002. Siemens will support TTY/CTM via an accessory cable and the handset will support the GSM bearer bit capability for signaling from the handset to the network.

Respectfully submitted,
Ilan Vardi
Siemens

Southern LINC

SOUTHERN COMPANY
Energy to Serve Your World℠

Southern LINC® TTY Status Report
2nd Quarter 2001

Southern LINC hereby submits its status report for 2nd Quarter 2001 in accordance with the reporting requirement contained in the Federal Communications Commission's Fourth Report and Order in CC Docket No. 94-102. Southern LINC continues diligently to pursue compliance with the FCC's TTY requirements. It regularly reviews the status and availability of an iDEN TTY solution with its sole vendor, Motorola, to ensure its ability to meet the FCC's deadline of June 30, 2002. Based upon the information it has received from Motorola, Southern LINC is currently of the belief that it will be able to deploy TTY capability to its customers by June 30, 2002.

Development Activities: Southern LINC continues to communicate with Motorola regarding the development status of both the network infrastructure and handset components required for TTY capability on an iDEN network.

Testing and Deployment Activities: Once the necessary upgrades have been made to iDEN handsets and the required software changes have been released on its network, Southern LINC will test the iDEN TTY solution. Its plans for testing will incorporate the public safety community to ensure compliance for 911 calling purposes.

Geographic Scope of Network Infrastructure Deployment: Southern LINC is a regional carrier providing service in Georgia and Alabama and portions of Florida and Mississippi. Its deployment of an iDEN TTY solution will encompass its entire network.

As its plans for testing and deployment become more concrete, based upon network software and handset availability, Southern LINC will be pleased to share that information with the Commission in a future report.

For questions regarding this report, please contact:

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Sprint PCS Report to the FCC
Prepared: 7/10/01

1. ***Network Infrastructure Software Development***
   - Lack of availability of bug-free software has delayed our ability to begin interoperability testing. This is resulting in a significant delay in our initial rollout projections. In our previous report we stated that we expected software delivery from our vendors first and second quarter this year.
   - Two of our infrastructure vendors have provided software to our labs; however, several significant bugs have been identified, inhibiting our ability to begin lab and field testing in the planned time frames. (Specifically, we are concerned with the time it will take for network vendors to add the bug fixes in Lucent's changes to the standard).
   - The other two infrastructure vendors have committed to providing software to our labs by late summer or early fall.
   - We are looking to the FCC to hold infrastructure software manufacturers accountable if we are going to be held to the drop-dead date of 6/02.
2. ***Handset development and testing plans***
   - TTY compatibility is dependent on Qualcomm's DMSS software (reference software integrated into their handset) distributed to licensees in April and May of 2001.
   - Following this release, handset manufacturers need to build a user interface (software).
   - Interoperability testing w/ infrastructure will follow - both at SPCS and in infrastructure labs.
   - We are dependent on handset vendors to provide TTY capable handsets prior to field-testing. We recently received handsets from four vendors and have just begun testing. Sprint PCS' remaining vendors are expected to deliver handsets within the calendar year.
   - Sprint PCS just received the final standards publication regarding cellular subscriber unit interface for TDD which may provide a solution to impedance issues related to the audio interface through the 2.5-mm jack. Sprint PCS will carefully review the standards publication and forward it on to its handset vendors.
   - We are looking to the FCC to hold handset manufacturers accountable if we are going to be held to the drop-dead date of 6/02.
3. ***Beta testing and lab testing***
   - SPCS requires both lab- and field-testing prior to implementation.
   - Our internal lab-testing and field-testing are extremely intensive and require approximately two to three months each.
   - We are planning to test with consumers in various markets prior to nation-wide deployment.
4. ***Release and general availability to carriers of network software***
   - Two of our four infrastructure vendors have provided software that supports TTY. We have requested software supporting TTY from our other infrastructure vendors as soon as it becomes available.
5. ***Availability to carriers of full acceptance test units***
   - See # 2
6. ***Efforts toward Achieving digital wireless solution compatibility with enhanced TTY devices.***
   - Sprint PCS is not pursuing a resolution of proprietary enhanced protocols as the FCC has temporarily relieved carriers of this responsibility. Sprint PCS will reevaluate enhanced protocols when industry standards supporting these protocols are in place.
7. ***Carrier Coordination of testing with PSAP***
   - PSAP testing will be conducted at the time of Beta trials.
8. ***Carrier testing activities, including field testing, consumer end-to-end testing***
   - As stated previously, SPCS requires both lab and field-testing prior to implementation.
   - The internal lab-testing and field-testing processes are intensive, requiring approximately two to three months each.
   - As a result, field testing has been delayed until early fall.
9. ***Retail availability of necessary consumer equipment***
   - TTY capable handset sales are projected for first quarter, 2002.
10. ***Geographic scope of network deployment***
   - SPCS plans to launch in specific markets in 2002, with nation-wide launch completed by June 2002.

TeleCorp Communications, Inc.
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Contact:
John Garner
Director, Regulatory Compliance
601-209-8201

Date: July 10, 2001

Purpose: Quarterly TTY Report for all Markets

Status: All Lucent MSCs will have the software infrastructure to accommodate the TTY/TDD feature on ECP Release 17.0 and 5ESS Release 15.1 BWM01-0008.

The TTY/TTD feature was tested as part of the Little Rock, AR Release FOA by the Lucent Team. The Test Plan is attached. All results were successful.

The Upgrade schedule for ECP 17.0 remaining markets are as follows:

Des Moines	07/13/01
Evansville	07/27/01
Little Rock	COMPLETED 5/4/01
Memphis 1	07/20/01
Memphis 2	07/13/01
Milwaukee 1	07/20/01
Milwaukee 2	08/10/01
New Orleans 1	07/27/01
New Orleans 2	08/03/01
Puerto Rico	07/13/01

The 5ESS BWM01-0008 will be loaded three days after the ECP is upgraded to release 17.0. All Markets should be ready of the TTY/TDD feature by 8/15/01.

Test Plan: Provided by Lucent FOA Team

1.1 FID 4526.0 - TTY/TDD Vocoder (Regulatory)

1.1.1 Feature Testing

1.1.1.1 Overview

This feature will enable users of EIA/TIA-825 standard text type terminals (also known as a TTY[6]/TTD[7] sets) to communicate over TDMA cellular phones with their legacy TTY/TDD sets. For the purposes of this new feature, a special TIA/EIA-136a phone, which is capable of passing TTY/TDD calls without character distortion, is required.

1.1.1.2 Testing Requirements

Software Requirements

There are no ECP/Cell translations associated with this feature. This feature is standard for this release. This feature requires 5E-15 - BWM01-0008, (FR-2) 5ESS software and all prior upgrades to and including BWM01-0007.

Hardware & Test Equipment Requirements

1. 2 ea. Special TDMA (IS-136A) TTY/TDD capable phones (Panasonic)
2. 2 ea. TTY/TDD Terminal 'off the shelf' text terminal units Ultra Tec 'Compact' for use with mobile end;
3. 1 ea TTY/TDD Terminal for Landline end (POTS use) - Ameriphone 'Q-90
4. No special hardware is required other than the 5E switch which has to use SM2K's and have PHV4's (vocodor in switch feature)

1.1.1.3 Test Cases

Test 01 TTY/TDD Test # 1 Mobile to Landline call

Use the TTY /TDD Capable mobile and make a call from the mobile to a wired (landline) TTY/TDD terminal. Perform this test on 16.1 and 17.0 cells

Part 1

Use the Ultratec Compact TTY for the mobile end and the Ameriphone Q-90 for the landline end.

[6] TTY is a registered Trademark of the Teletype Corporation and Lucent Technologies).
[7] Telecommunication Device for the Deaf.

Exchange in both directions (at minimum) 6 lines, at a manual typing cadence, the following TTY character test message string (that uses all the letters and figures of Baudot code):

TEST MSG THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG' S BACK 1234567890 <CR>

The test message is derived from TIA/EIA 825.
Additionally send 6 times similar strings of the remaining Baudot characters available on the TTY/TDD terminals

Part 2
Repeat the same test by using the automatic send feature of the TTY text terminals (from the send buffer). Send at least 15 lines of the test message (approximately 1000 printable characters). Do this test in each direction. There shall no more than 1% (10) characters that are in error.

Test 0 2 TTY/TDD Test #2 Landline to Mobile Call

Use the TTY /TDD Capable mobile and make a call from a wired (landline) TTY/TDD terminal to the TTY/TDD mobile. Perform this test on 16.1 and 17.0 cells

Part 1
Use the Ultratec Compact TTY for the mobile end and the Ameriphone Q-90 for the landline end.

Exchange in both directions (at minimum) 3 lines , at a manual typing cadence, the following TTY character test message string (that uses all the letters of the alphabet and numbers):

TEST MSG THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG' S BACK 1234567890 <CR>
The above message is derived from TIA/EIA 825.

Part 2

Repeat the same test by using the automatic send feature of the TTY text terminals (from the send buffer). Send at least 15 lines of the test message (approximately 1000 printable characters). Do this test in

each direction. There shall no more than 1% (10) characters that are in error.

There shall be no more than 1% character errors.

Test 03 TTY/TDD Test #3 Mobile to Mobile Call

Use the TTY /TDD Capable mobile and make a call from the mobile to another TTY/TDD mobile terminal. Perform this test on 16.1 and 17.0 cells.

Part 1
Use the Ultratec Compact TTY for both mobile ends.

Exchange in both directions (at minimum) 3 lines , at a manual typing cadence, the following TTY character test message string (that uses all the letters of the alphabet and numbers):

TEST MSG THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG' S BACK 1234567890 <CR>
The above message is derived from TIA/EIA 825.

Part 2

Repeat the same test by using the automatic send feature of the TTY text terminals (from the send buffer). Send at least 15 lines of the test message (approximately 1000 printable characters). Do this test in each direction. There shall no more than 1% (10) characters that are in error.

There shall be no more than 1% character errors.

Test 04 TTY/TDD Test #4 Mobile to E-911 Call Center

Prearrange with TTY Forum Representative[8] to make a t least three test calls from a TTY/TDD mobile to the 911 communications center. The 911 center has to have TTY/TDD capability to perform this test. Perform this test on 16.1 and 17.0 cells

Use the TTY /TDD Capable mobile and make a call from the mobile to the TTY/TDD terminal at the 911 center. Exchange in both

[8] TTY Forum Representative to be determined. Point of Contact to be provided by Jim Huntley (Lucent)

directions (at minimum) 3 lines at a manual typing cadence. Use the following TTY character test message string:

911 TEST MSG THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG' S BACK 1234567890 TIMES TEST MESSAGE

The above message is derived from TIA/EIA 825.

There shall be no more than 1% character errors.

Test 5 TTY/TDD Test #5 Landline to Mobile Call

Use the TTY /TDD Capable mobile and make a call to a wired (landline) TTY/TDD Relay Center from the TTY/TDD mobile. Access the Arkansas Relay Center by calling from the mobile 800-285-1131(TTY/TDD). The voice number to coordinate the testing with the Arkansas Relay Center is 800-285-1121. Perform this test on 16.1 and 17.0 cells. Alternately, use AT&T (800) 855-2880 (TTY) AT&T (800) 855-2881 (Voice) in lieu of the Arkansas numbers.

Part 1

Use the Ultratec Compact TTY for the mobile end and the Ameriphone Q-90 for the landline end.

Exchange in both directions (at minimum) 3 lines , at a manual typing cadence, the following TTY character test message string (that uses all the letters of the alphabet and numbers):

TEST MSG THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG' S BACK 1234567890 <CR>

The above message is derived from TIA/EIA 825.

Part 2

Repeat the same test by using the automatic send feature of the TTY text terminals (from the send buffer). Send at least 15 lines of the test message (approximately 1000 printable characters). Do this test in each direction. There shall no more than 1% (10) characters that are in error.

There shall be no more than 1% character errors.

TMP CORP.
TTY REPORT
June 30, 2001

At the present time, TMP Corp. ("TMP") does not have an operational system; however, TMP expects to be on line by Fall of 2001. The following information is based on representations made to TMP Corp. by its vendors. TMP does not have the ability to independently verify these release dates and is reliant upon its vendors to implement the TTY solution in TMP's handsets and network.

1. Network infrastructure software development

Tecore, our switch manufacturer and AirNet our network infrastructure manufacturer are aware of TTY requirements. Software compliance is under evaluation at this time.

TMP is dependent upon a solution being made available by the infrastructure vendors.

2. Handset development and testing plans

At this point we are working with handset manufacturers to validate a solution for deployment in our network by the date tentatively set by the FCC.

The absence of a firm commitment by manufacturers of TTY compatibility for PCS handsets remains a major concern for TMP to provide appropriate handsets and comply with the 12-31-01 FCC mandated deadline.

TMP continues to work with its handset vendors to ensure TTY access to E911 for our consumers.

3. Beta testing and lab testing

TMP will begin testing TTY compatible equipment when solutions are provided by network infrastructure and handset vendors.

4. Release and general availability to carriers of network infrastructure software

TMP is awaiting updated reports of software availability from switching and network infrastructure vendors.

5. Availability to carriers of full acceptance test units

TMP is awaiting software and hardware availability from switching, network infrastructure, and handset vendors.

6. Efforts toward achieving digital wireless solution compatibility with enhanced TTY devices

TMP remains dependent upon the availability of vendor provided solutions to meet the FCC's mandated timeline (12-31-01) to provide E911 TTY access to our networks.

We expect the GSM functional performance to be similar to the other technologies and to meet or exceed all of the TTY Forum's Consumer Group requirements.

Much work will need to be done to implement the GSM solution in our network over the next year.

7. Carrier coordination of testing with PSAP

TMP's PSAP testing target date is 9-1-01. The target date is dependent upon solutions provided by network infrastructure vendors and handset vendors.

8. Carrier testing activities, including field testing, consumer end-to-end testing, and other necessary tests

Testing will begin immediately upon receipt of software and hardware from vendors.

9. Retail availability of necessary consumer equipments

TMP is dependent upon the availability of handsets from vendors. At this time, TMP has not received a firm commitment from its handset vendors.

10. Geographic scope of network infrastructure deployment

TMP service area – BTA 367

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Contact:
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Director, Regulatory Compliance
601-209-8201

Date: July 10, 2001

Purpose: Quarterly TTY Report for all Markets

Development Activities

1. network infrastructure software development;
   Ericsson has informed Tritel Communications Inc. that a patch to generic version 7 software will enable TTY compatibility.
2. handset development and testing plans;
   Tritel relies on its venders for development and testing of handsets.
3. beta testing and lab testing;
   Tritel relies on its venders for development and testing of handsets and mobile switch hardware and software.
4. release and general availability to carriers of network infrastructure software;
   no formal commitment to availability has been received from Ericsson as of this date.
5. availability to carriers of full acceptance test units;
   No firm commitments to availability have been received as of this date.
6. efforts toward achieving digital wireless solution compatibility with enhanced TTY devices;
   Tritel relies on its venders for development and testing of this solution.

Testing and Deployment Activities

7. carrier coordination of testing with PSAP;
   Tritel will utilize relationships developed during Phase I E911 implementation to arrange end to end testing.

8. carrier testing activities, including field testing, consumer end-to-end testing, and other necessary tests;

   Tritel will develop complete testing procedures in conjunction with its venders.

9. retail availability of necessary consumer equipment;

   No firm commitments to availability have been received as of this date.

10. geographic scope of network infrastructure deployment;

    Tritel has made no deployments as of this date.

US Cellular

TTY Forum 18 Quarterly Report

There have been no scheduling changes concerning the deployment of Baudot TTY over digital wireless facilities as reported in the TTY Forum 17 report which is attached.

The infrastructure availability and the handset availability are the critical items that will jeopardize the deployment. Our infrastructure vendors are on schedule.

US Cellular has not received any firm schedules from our handset vendors for product availability. US Cellular is actively escalating the product availability issue with our present handset vendors and is pursuing new vendors, which will allow us to meet the June 2000 roll out.

TTY Report for June 2001

Contents

2. Purpose

This document outlines the progress made by VoiceStream toward the mandates required by the FCC for wireless TTY access to emergency services and full user-to-user functionality. The document is for information purposes-.

3. Executive summary

Standardization work for a GSM TTY solution is continuing and VoiceStream is active in facilitating decisions that will enable 911 access as well as full user-to-user functionality. VoiceStream will deploy both NSS and BSS solutions, depending on which is the most cost-effective and timely solution for VoiceStream.

VoiceStream has been working with the global GSM community to get agreement on a common signaling mechanism applicable to both NSS and BSS solutions. Having obtained that agreement on using bearer capability signaling, VoiceStream is actively working with that community to insure that the standards work necessary to begin deployment of those solutions is completed in a timely manner. Even though the solutions are meant to address the needs and requirements of the North American hearing impaired community, the standards that must changed are developed in the 3rd Generation Partnership Project (3GPP) and thus global agreement must be obtained.

While the actual standardization work is progressing, VoiceStream has had regular meetings with all its vendors and has firm proposals for the NSS and both BSS based solutions. Because of our mix of equipment and vendors in our networks, VoiceStream anticipates deploying all three solutions but is committed to using the common bearer capability signaling for the options requiring it.

Based on the current information from our vendors, VoiceStream expects to have all solutions available for testing and trial deployment by December 2001, with full implementation by the June 30, 2002 date.

4. Background

Since September 1997, the Wireless TTY Forum (TTY Forum), representing wireless carriers, wireless equipment manufacturers, manufacturers of TTY devices, public safety organizations, and consumer organizations representing individuals who are deaf or hard-of-hearing has been meeting in an effort to develop solutions that will enable TTY users to make 911 calls on digital wireless networks. Technical solutions had been proposed for all major wireless standards and these solutions have been under going study in the relevant technical bodies, TR45.5 (CDMA), TR45.3 (TDMA) and T1P1/3GPP (GSM).

The GSM solution revolves around using CTM (Cellular Text Telephony Modem) as a method of transmitting Baudot over the GSM network. It is difficult to transmit Baudot code over the digital channel of GSM to the FCC-mandated 1% Total Character Error Rate (TCER), as the digital codecs have been optimized for speech. Baudot uses frequency components at 1.4 and 1.8KHz which would be attenuated by the low pass filtering in the codecs. In addition, the error

correcting protocols of GSM result in the character error rate for a Baudot Code transmission increasing dramatically in case of a decreasing channel quality.

For this reason, CTM had been designed to work with all speech coding strategies and it has been successfully tested with the relevant codecs for the US, which are the GSM FR, EFR and all modes of the AMR codec. CTM signals have components only between 400 Hz and 1000 Hz, which corresponds to the nature of human speech. A converter would handle the CTM functionality at the mobile, which would be either incorporated into the mobile or available as a clip-on/add-on unit. The three documents specifying CTM have now been approved in the US as American National Standards. These documents have also been submitted to 3GPP and have become the basis for the specifications developed by that group for all GSM systems worldwide.

5. Recent Standards Activity

At the most recent 3GPP plenary, there were 2 solutions proposed for GTT- transcoder based and server-based. Advantages and disadvantages for each solution had been debated, and the TSG SA Plenary agreed that a Workshop should try to address the issues of both solutions in order to provide an early Rel-5 solution. Gary Jones of Voicestream chaired the workshop, held in Dusseldorf, Germany. Discussions provided a proposal that the Workshop investigate the priorities needed for developing the solutions for GTT/TTY support and conclude if there are common paths for the prioritization of the work.

The workshop concluded that for those vendors supporting an NSS solution only a phased approach would be necessary. The first phase would support the mandated FCC E911 requirements requiring all Emergency Calls (911) to be sent along a dedicated network path capable of converting CTM into Baudot protocol. Phase two would then support the full user-to-user features and would require additional standardization work. A detailed elaboration of the ways to realize the implementation of these options was developed. It was acknowledged that the best outcome would be the completion of both phases in time to meet the FCC mandate.

Subsequent to the workshop, vendors and operators alike worked almost continually to develop consensus around a common signaling mechanism that would facilitate complete user-to-user services, 911 access, interoperability between NSS and BSS options and be implementable by the FCC-mandated date for 911 access of June 30, 2002.

Within the past several weeks, a proposal to use Bearer Capability Signaling from the handset to the network for both the Trau pooling as well as the server-based solutions has been agreed upon by all the major GSM vendors and US operators. This solution for a common signaling mechanism will allow a handset to signal the network at call setup that it is sending a CTM call and thus the network can direct that call to a network path that can convert the CTM signal into Baudot. A diagram of the architecture supporting this signaling mechanism is attached as Annex 1.

Because the signaling mechanism is common to both the sever as well as the Trau pool solutions, the operator can choose the equipment option that best fits its equipment implementation and still maintain interoperability across platforms. This capability uses a signaling mechanism that already exists in the specifications and is utilized today when setting up a normal voice call. Because this signaling mechanism is common across the options that require its use, it is totally transparent to the user – that is, a TTY call can be made by any CTM-capable handset regardless of the network implementation utilized by the operator.

Since the agreement was reached, vendors and operators have been working in the various 3GPP technical working groups to reach approval of the necessary changes to the 3GPP specifications. Expectations are now that the changes to the specifications will be approved and necessary modifications to the systems will be in the operator's networks by the June 30, 2002 deadline.

Operators are also working with handset vendors to assure a supply of CTM-capable handsets. However, because of lead times and equipment availability issues beyond the control of operators, use of a smart cable attached from the handset to the TTY device, which incorporates the CTM modem and bearer capability signaling may be necessary at the June 30, 2002 date.

5.1 The status of the standardization work as of May 19th 2001

The Global Text Telephony (GTT) activities in 3GPP SA2 and CN1 meetings in Puerto Rico, May 14-18, 2001 ended by accomplishing its goals, thanks to intensive co-operation between interested parties. (All documents referenced here are available on the www.3gpp.org web site.)

The current status of the GTT (TTY) standardization work is now:

Addition to main architecture TS 23.002 for GTT

Document S2-011468, agreed to go to SA for approval for Rel-5.
It is a very brief addition specifying three ways to add text telephony interworking in the network.

GTT Stage 2 - Architecture, TS 23.226,

Document S2-011540 describes how text conversation can be handled in 3GPP networks. For text telephony through the voice channel, three main architectures are described, with many different opportunities for implementation variations. All are adding CTM detection/conversion functions to the network.

-The "All transcoder solution." with CTM on every circuit on the way out to the terminals.
-The "CTM Circuit pool solution" with a mechanism for selecting a circuit on the way to the terminal that has the proper CTM detection/conversion capabilities, based on the terminal indicating CTM capabilities.
-The "CTM-SRF service node solution" with a service node in the core network and a mechanism to route through it for CTM detection/conversion.

Each method is described in a separate informative Annex, and the main characteristics are described in the main body of the document. The alternative transports of text standardized in IP Multimedia, CS Multimedia and un-standardized in Data channels are also introduced.
It was agreed to send it to SA for approval for Rel-5.

Change in TS 24.008 Mobile Radio Interface, Layer 3 for indication of CTM text telephone capability in the terminal

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Document N1-010906 describing an addition to Bearer Capability to indicate active CTM support in the terminal, with the intention that the network can use this indication to select circuits with CTM conversion support.

It was agreed to send the document to CN for approval in June as a separate CR, so that if any party finds any backwards compatibility issues, they can issue another proposal to the CN meeting.

GTT Stage 1, recently approved in SA1.

In the S1 meeting the week before this, the GTT Stage 1 description was agreed to be sent to SA for approval. Ericsson had issued comments towards the proposed changes, because some of them were not in line with the total goals of the GTT work item. These comments were not approved by SA1 and should be revisited, but it is not critical for the immediate progress of the work and initial implementations.

6. VoiceStream's Network Progress

VoiceStream has had regular meetings with all its vendors and has firm proposals for the NSS and both BSS based solutions. Because of our mix of equipment and vendors in our networks, VoiceStream anticipates deploying all three solutions but is committed to using the common bearer capability signaling for the options requiring it. For two of our vendors, all hardware is in place and for the third vendor, we are waiting on a single hardware node, which we expect to be delivered soon. Software and testing is awaiting completion of the standards work in 3GPP. Handset testing is awaiting the delivery of CTM capable phones.

Based on the current information from our vendors, VoiceStream expects to have all solutions available to begin testing in October 2001, ready for deployment in December 2001, with full implementation by the June 30, 2002 date.

PSAP testing coordination will be started after the network software has been delivered and handsets are available for testing. Consumer end-to-end testing will only be started after all other testing is complete.